



WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2004MN65B

Title: The Effects of Long-Term Low-Level Antibiotic Exposure on the Development of Antibiotic Resistance

Project Type: Research

Focus Categories: Non Point Pollution, Ecology, Water Quality

Keywords: antibiotic resistance, antibacterials, pharmaceuticals

Start Date: 03/01/2004

End Date: 02/29/2005

Federal Funds Requested: \$5,490

Non-Federal Matching Funds Requested: \$10,816

Congressional District: 5

Principal Investigator:

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Abstract

Antibiotics have been observed in the environment at low, subtherapeutic levels. The proposed study is designed to test whether the presence of antibiotics at these levels may lead to proliferation of antibiotic resistance among exposed microorganisms. The main objective of the project is to determine if the proportion of bacteria that are resistant to antibiotics increases with long-term exposure at the low levels found in the environment. Experiments to test the connection between low-level exposure and development of resistance will be performed in chemostats; bacteria obtained from a pristine environment will be exposed for a period of one year to four antibiotics at concentrations that have been observed in natural waters. Enumeration of the proportion of bacteria from the chemostats exhibiting antibiotic resistance will be performed periodically using heterotrophic plate counts. A secondary objective is to explore whether any observed increases in resistance are likely due to selection of intrinsically resistant organisms or development of resistance by new organisms. Genetic analysis tools will be used to identify resistant bacteria if changes in resistant phenotypes are observed over time. The results of this work will help with evaluation of the acceptability of the current levels of these compounds in natural waters.